

GAS GANGRENE

Gas gangrene was of extremely rare occurrence among battle casualty wounded both in our African and Italian installations. It must be interpolated, however, that during the six months of the Italian campaign when gas was most frequent (January to June, 1944) the 12th General Hospital was not set up and functioning. Of the eight cases diagnosed as gas gangrene clinically, six were seen in Africa, one at Rome and one at Leghorn. Of these eight cases, however, the diagnosis was substantiated by either culture or microscopic or both section in but five cases, four of the African cases, and a fatal POW case in Rome. In two of the other three the condition was due to vascular damage while the third was a buttock wound with rectal involvement and extensive muscle necrosis.

Case 1: Field Artillery soldier wounded in action near Tebessa, Algeria on or about 21 February 1943. Three wounds of right popliteal region were cleansed and sulfonamide powdered into them at the Medical Battalion. He was sent through a surgical hospital and a station hospital to arrive at the 12th General Hospital 25 February 1943 with a dead leg below the knee, crepitation and swelling in the thigh, toxic and with moderate fever. Immediate high thigh amputation was done. The popliteal artery was found to have been severed and the adductor muscles of the thigh were found involved by anerobic myositis (gas gangrene). 30,000 units of anti-gas serum were given. No culture was made. Microscopic section of muscle was considered pathognomonic for gas. Recovery after a stormy course. Evacuated to the Zone of Interior, 1 April 1943.

Case 2: A 25 year old Medical Battalion soldier was wounded near Thale, Tunisia, 21 February 1943, receiving a compound, comminuted fracture of the left femur entering the joint. He was given blood and plasma at a surgical hospital, transferred to a station hospital, thence to the 12th General Hospital on 27 February 1943. There was severe pain in the left lower extremity which was dead below the knee. The temperature was 103. Gas was seen in the wound and palpated in the tissues. An immediate mid-thigh amputation was done. 30,000 units of anti-gas serum were given and sulfonilamide started by mouth. The pathologist confirmed the diagnosis of dead leg due to popliteal artery division but did not substantiate diagnosis of gas gangrene. Recovery was rapid and the patient was boarded to the Zone of Interior in traction cast, 12 April 1943.

Case 3: A 29 year old Air Service soldier sustained severe, penetrating wounds of the right thigh and both legs when his jeep ran over a land mine, 27 March 1943 at Thalepte Airfield, Tunisia. Severe hemorrhage occurred from injury to the right popliteal artery. The wounds were debrided and foreign body removed from the right thigh at an evacuation hospital. He arrived at the 12th General Hospital with a cold, cyanotic, pulseless, numb, tensely swollen right leg. The temperature was 102 and the pulse, 100. The leg was crepitated and gas fizzled from the wound when dressing was removed. The patient was semi-comatose and complained of severe pain. An immediate thigh amputation was done four inches above the knee and 10,000 units of anti-gas serum were given at once. Repeated plasma and whole blood transfusions were given and 30,000 units of anti-gas serum administered on two successive days. Recovery was slow but satisfactory and the patient was boarded to the Zone of Interior 24 May 1943. Welch bacillus was found on culture.

Case 4: A 28 year old paratrooper was wounded at 1115 hours, 12 July 1943, during descent, the missile entering the left buttock, passing thru the rectum to lodge in the perineum on the right side. There were numerous other minor penetrating wounds of the buttocks. The projectile was removed from the perineum and a double-barreled sigmoid colostomy done, the buttock wound debrided, twelve hours post-wounding at a forward hospital and the patient transferred via hospital ship to the 12th General Hospital, 17 July 1943. He arrived in fair condition but with evidence of recent hemorrhage. A more severe hemorrhage occurred the next day when examination of the wound revealed a large clot, necrosis of wound edges, tenseness and induration, and crepitation. A preoperative diagnosis of gas infection was made. The wound was immediately widely excised, necrotic muscle and bits of fractured sacrum were removed and the rectum opened widely. Repeated anti-gas serum given. Cultures were negative for gas bacilli. The patient made a rapid recovery and was boarded to the Zone of Interior.

Case 5: This 27 year old soldier was wounded in the right thigh and calf by shell fragments, 9 September 1943, in the Salerno landing; producing a compound fracture of the distal third of the femur. He was apparently given his initial surgery on shipboard and on the way back to Africa, gas was diagnosed and additional incisions made in the thigh on 13 September. He arrived at the 12th General Hospital in poor condition, with marked swelling of the entire right thigh and thick, dark, oddly smelling pus draining from the wounds. Dressings were changed, intravenous fluids were administered and sulfadiazine started intravenously. Ten hours later the condition worsened, the pulse was high and bounding, and there was then no question as to the presence of gas gangrene. At operation (high thigh amputation) much necrotic muscle was found in the thigh and a high amputation was performed, the deep muscles being found involved with gas; potentially above the site of separation of the limb. Although there was some immediate improvement in the patient's condition in the ensuing 24 hours, the situation deteriorated rapidly, extreme toxemia with rapid pulse, fever of 102 degrees F., in a perfectly lurid patient. Sixty thousand units of gas antitoxin delivered intravenously, may have caused a momentary betterment. The patient died, lurid to the last, early on the third post operative day. Organisms having the morphology of the clostridium group were recovered on direct smear and *Cl. welchii* was grown on anaerobic cultures.

Case 6: This 25 year old 2nd Lieutenant was wounded in action by enemy hand grenade, 9 September 1943, near Naples, Italy, causing multiple, penetrating, severe, wounds of both legs, right arm, and left buttock; compound fracture of the left foot and right tibia and fibula. Treated on beach with plasma and, the legs were splinted on ship after wounds were covered with sulfonilamide powder. Examination on admission reveals a pale, tired, soldier. Pulse good quality, both legs in splints. Multiple, penetrating, severe, wounds, of left foot and leg, and right lower leg; small, penetrating, wound of right arm; penetrating wounds of left buttock; compound, comminuted fractures of bones of left foot and compound fracture of the right tibia and fibula. Blood transfusions given immediately. Culture and smear from leg wounds confirmed clinical findings of gas gangrene in both legs. Given 50,000 units of anti-gas gangrene antitoxin intramuscularly, and supportive measures of blood, plasma, and fluids. Taken to the operating room, 15 September 1943, where wounds of both legs were incised widely and debrided. A Gerrard screw held the compound fractured right tibia in alignment. Splints and massive wet packs were applied. On 16 September 1943, 40,000 units antitoxin were given intramuscularly, and on 19 September 1943, 50,000 units antitoxin were given intravenously. Multiple transfusions and sulfathiazole were given orally. Daily debridement and dressing change. Cultures repeated and were again positive for gas forming organism, *B. Welchii*. Left foot and leg improved but right leg did not. Edema and gas gangrene gradually spread in spite of efforts. Patient was becoming more toxic, therefore a guillotine, mid-thigh, amputation of the right leg was done, 22 September 1943. Improved immediately postoperative. On 24 September 1943, the patient had a hemorrhage from the amputation stump. Vessel was ligated in the operating room. Postoperatively, the patient gradually improved. Left leg cleared up nicely except for osteomyelitis of the 1st metatarsal, 1st cuneiform, navicular and talus. Left leg was put in a cast, 1 November 1943. Stump of the right leg has stockinette traction and is healing well. Other wounds are healed. General condition good. Temperature normal. Total blood intake, 5000 cc; plasma, 3000 cc. Boarded to Zone of Interior 8 November 1943.

Case 7: This 24 year old German soldier received severe wounds of the left thigh with compound fracture of the femur, the left shoulder with compound fracture of the humeral head and glenoid fossa, of the right side of chest and left shoulder. Debridement was done same day at the 56th Evacuation Hospital, hip and shoulder spica were applied, penicillin and tetanus antitoxin given and 500 cc. of blood given. He arrived at the 12th General Hospital in good condition and the casts were not disturbed. On 19 July a brawny edema became evident and spread rapidly onto the anterior abdominal wall. The patient was in extremis almost by the time the situation was recognized. He died about 18 hours after the first symptoms were noted. Pathologic diagnosis: Clostridial myositis, fulminating (oedematiens variety).

Case 8: This 32 year old soldier was wounded in action by shell fragments at 1330 hours, 11 April 1945, near Massa, Italy. He sustained a right thoraco-abdominal wound with foreign bodies lodging in the liver; penetrating wounds of the left fourth finger, left arm and left thigh. A penetrating wound of the right leg produced a fracture, compound, comminuted, of both the tibia and fibula. Numerous large foreign bodies were retained. Debridement of the multiple wounds was done at 1900 hours, 11 April 1945 at a field hospital. At the same time the pleura was evacuated and the diaphragm repaired, entering the wound of entry at the level of the 4th rib, antero-laterally. The liver bed was not drained; the chest was closed without drainage. A plaster of paris cast was applied to the right leg. On 20 April 1945, at the 12th General Hospital, a supracondyler amputation was done, made necessary because of gas infection at the site of fracture and retained foreign bodies. The stump is now in traction. The other wounds were not clean enough for secondary closure but are healing kindly. Boarded to the Zone of Interior on 5 May 1945. The pathologist reported no gas gangrene but vascular injury present.